

of liquid air it is at once cooled so intensely that all the moisture it contains is precipitated as frost on the sides of the vessel. Whatever gaseous moisture is left in the air at this low temperature is entirely inappreciable to our methods of measurement. This air may, therefore, be considered practically dry and may be passed on into other vessels for such experiments as our correspondent has in mind.

The different tensions of ice vapor and water vapor are explained in an important memoir by Prof. M. Thiesen, of Berlin, which we hope to publish for the information of our readers.

TEMPERATURE AND MOISTURE OF SOILS IN RED RIVER VALLEY.

In the October report of the North Dakota Section, Mr. B. H. Bronson publishes the first part of an excellent paper entitled *Some Studies in Meteorology*, by Prof. E. F. Ladd of the Agricultural College at Fargo, N. Dak. Professor Ladd says that he proposes to publish the results of the continuous observations made at that place since August, 1891. His first study relates to the question of earth temperatures, the depth of the frost, and the quantity of moisture offered to the growing wheat by the thawing of the soil when the rainfall is small and even deficient, upon which matters misconceptions seem to have arisen.

The temperatures of the soil have been determined by means of thermometers at eight different depths, viz, 1, 3, 6, 12, 24, 48, 60, and 84 inches. The instruments were of the pattern designed by Dr. Sturtevant for use at the New York State Experiment Station. In only one winter, that of 1895, did the frost line reach down 5 feet, but each year it passed below 4 feet. The frost was all out of the ground by the 20th of May each year, with a possible exception of 1892-93. It is evident, therefore, that the gradual thawing of the frozen ground, during the summer months can not be a source of moisture to supply the growing crop of wheat. The fact is that the soils of the Red River Valley have the power of holding large quantities of water in storage.

The mean temperature of the soil at different depths, as observed daily at midday for seven years, 1892-1898, is shown in the following table:

Months.	Depth of thermometer, in inches.							
	1.	3.	6.	12.	24.	48.	60.	84.
May	56.6	50.8	46.8	43.9	38.7	34.3	33.7	34.8
June	67.0	61.9	58.8	57.6	51.0	44.0	40.9	38.0
July	74.1	67.9	65.2	63.6	59.3	53.1	49.1	43.7
August	75.6	66.2	64.5	63.5	61.0	56.0	52.9	47.4

THE WEATHER OF THE MONTH.

By ALFRED J. HENRY, Chief of Division of Meteorological Records.

The chief characteristics of the month were high temperatures, relatively heavy rains for the season, light winds, and an absence of severe local or general storms.

Cloudiness was generally greater than usual and the relative humidity of the air was in excess of the normal in the majority of districts.

PRESSURE.

The distribution of monthly mean pressure, shown by Chart IV, differs in several important particulars from the normal distribution for October. The most important departure from normal conditions was the apparent shifting of the area of high pressure usually found over Georgia and South Carolina, to the Middle Atlantic and New England States. It will also be noticed that the monthly means over the last-named region average about 30.20 inches, which value is greater than the local normal October pressures, and also greater by a tenth of an inch than the normal October pressure over the south Atlantic States.

The configuration of the monthly mean isobars follows a summer type more closely than an autumnal one, and is typical of a wet rather than a dry month in the interior valleys and generally to the westward. In a dry October the monthly mean isobars generally run east and west, and the two dominating highs are frequently joined in a ridge of high pressure extending from the Georgia coast to the Plateau region.

TEMPERATURE OF THE AIR.

The distribution of monthly mean surface temperature, as deduced from the records of about 1,000 stations, is shown on Chart VI.

East of the one hundredth meridian the temperature was above normal by amounts ranging from 6° and 8°, daily, in the middle Mississippi Valley, to less than a degree on the Atlantic coast. West of the above-mentioned meridian temperature was below normal by amounts ranging from 4° in eastern Oregon to less than a degree on the Pacific coast.

A period of abnormally high temperature in the central and eastern portions of the country set in about the 10th and continued until about the 25th. During this period unusually high temperatures were recorded in the Mississippi and Missouri valleys, the Lake region, and eastward to New England.

The lines of freezing temperatures did not extend so far south as in the corresponding month of 1898, and in general the minimum temperatures were not so low as in that year, while the maximum temperatures were higher.

Average temperatures and departures from the normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
New England	10	52.8	+ 1.9	+ 2.2	+ 0.2
Middle Atlantic	12	58.3	+ 2.5	+ 0.7	+ 0.1
South Atlantic	10	66.0	+ 1.9	+ 2.0	+ 0.2
Florida Peninsula	7	65.1	+ 1.4	+ 3.5	+ 0.4
East Gulf	7	69.3	+ 2.5	+ 1.7	+ 0.2
West Gulf	7	70.9	+ 3.8	+ 1.6	+ 0.2
Ohio Valley and Tennessee	12	61.6	+ 4.9	+ 4.3	+ 0.4
Lower Lake	8	56.2	+ 4.9	+ 6.4	+ 0.6
Upper Lake	9	51.9	+ 5.0	+ 1.0	+ 0.1
North Dakota	7	43.4	+ 0.8	-18.6	- 1.9
Upper Mississippi	11	58.8	+ 6.1	+ 1.0	+ 0.1
Missouri Valley	10	57.9	+ 5.2	+ 4.0	+ 0.4
Northern Slope	7	44.4	+ 1.8	-25.0	- 2.5
Middle Slope	6	58.8	+ 3.6	+ 3.2	+ 0.3
Southern Slope	6	65.8	+ 4.1	+ 4.7	+ 0.5
Southern Plateau	13	57.9	+ 1.6	+ 6.5	+ 0.6
Middle Plateau	9	46.8	+ 3.2	-14.3	- 1.4
Northern Plateau	10	45.7	+ 3.2	-16.9	- 1.7
North Pacific	9	51.1	+ 0.8	-12.4	- 1.2
Middle Pacific	5	58.2	+ 1.3	+ 4.9	+ 0.5
South Pacific	4	61.5	+ 1.9	+ 5.5	+ 0.6